



# qualityhome®

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A BI-MONTHLY NEWSLETTER FOCUSING ON CONSTRUCTION QUALITY

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## Quality Homes® in Demand at Summerset at Frick Park

Every homebuilder dreams of customers banging down their door, begging "Build me a home!" The builders at the Summerset at Frick Park community in Pittsburgh, Pennsylvania, are getting closer to that dream. But it hasn't come easy. In an effort to meet the community's performance goals, each of the builders has had their share of struggles in learning new ways of designing and building their homes. The payoff makes it worth it in the end, though, as strong and constant demand for Summerset homes has boosted their bottom line.

STORY ON PAGE 2



# Quality Homes® in Demand at Summerset at Frick Park

By noon on October 19, 2003, the sun had melted through some of the thick, gray clouds that were blanketing the sky all morning, and was shining in patches on the several hundred people gathered in the Summerset at Frick Park community in Pittsburgh, Pennsylvania. The group applauded the city's mayor and members of the community's development team as they cut the ribbon to officially open Crescent Park. Crescent is the first of several public parks in the community, all of which will include trail heads to the city's popular public park, Frick Park. Among those gathered were the families that live in the community's first 52 homes constructed, and a number of the hopeful buyers who signed up for the next building phase lottery.



While conveniences like having access to an extensive public park system are important to homeowners, a key ingredient in the community's success is the quality of the homes being built.

The 710 homes to be built in three phases over seven years will have innovative housing technologies and quality construction practices, like being 30% more energy efficient than homes comparable in size. New, more durable building materials are being used. Improved construction practices, like integrated flashing, wall drainage planes, and water management systems at the foundation, contribute to effective moisture control. And carefully considered mechanical system designs help to ensure proper heating and cooling

airflow distribution and improved occupant comfort.

While each of the builders had their own unique growing pains (some builders had to learn a completely different way of thinking, while others were familiar with the ideas but still had to work hard to ensure the design strategies were implemented well in the field), their payoff is the strong sales resulting from high customer demand for quality homes. The innovative technologies and construction practices mean the Summerset homes perform better than many of their Pittsburgh counterparts—and customers are willing to pay for the quality. More than 400 potential buyers signed up for the next building phase lottery, in which 65 lots will be sold. With such high demand, lucrative sales for the builders are guaranteed.

While these homes are better than most, several Summerset builders want to take their construction quality to a higher level to cater to a niche market that wants upgrade packages. These builders are working with IBACOS through the Department of Energy's Building America program, and their homes' performance has been exceeding Summerset's standards. For a case study of one such builder, Jayar Construction, see page 3.

Another builder, Montgomery & Rust, is constructing a Green Demonstration Home, which will build on the high performance platform by incorporating more sustainable

**The 710 homes to be built in three phases over seven years will have innovative housing technologies and quality construction practices, like being 30% more energy efficient than homes comparable in size.**



interior finish materials. The builder will use this home to determine the feasibility of offering "green" upgrade packages to those consumers who desire it.

Melissa Titus, Project Manager for EQA Landmark Communities, one of the development partners, says, "All the homes built at Summerset are so much better than typical new houses built today because they have to comply with our performance standards. But there are some customers who want to go to an extra level, and this Green Demonstration Home will promote green upgrades to those people."

With the first construction phase complete and the next beginning, Summerset builders are realizing that the quality of the homes is closely tied to the homeowner's satisfaction, which impacts both customer referrals and, ultimately, the builder's reputation. And while the road to quality isn't easy, the customer demand at the end of the journey has been well worth it. Read more about customer satisfaction on page 4.

For more information on Summerset, read "Who Says Quality Doesn't Sell?" in the May 2002 issue of the Quality Home® newsletter. [\[link\]](#)

Frank Shoderbek leans with both hands on the light brown granite counters in the kitchen of Lot 18, an approximately 6,000 square foot red-brick home within the Summerset at Frick Park community (see page 2 for more information on Summerset). This house is in the final finish stages, almost ready to treat its new occupants to low energy bills, a comfortable, safe, and healthy living environment, and the promise of being durable enough to pass down through generations. As with all homes built at Summerset, Lot 18 is designed to be at least 30% more energy efficient than typical homes. Frank, Project Manager for Jayar Construction, who built this house and several other custom, estate-type homes at Summerset, has found that building energy efficient homes is worth the investment. If you're committed and it's done right, it's worth it.

how to implement the quality construction practices necessary to achieve those standards.

Jayar took the ball and ran with it. Committed to building quality homes, Jayar and their trade contractors enthusiastically learned the technologies and approaches during the construction of the first Estate Home. They used what they learned to then improve both the quality of all the homes they've built at Summerset since, as well as the quality of their construction practices. The homes they're building are efficient, durable, and safe, healthy, and comfortable for the occupants.

How did Jayar do it? Increased insulation (including at the foundation), significant air sealing, and high performance windows with a low-emissivity coating improved the performance of the building envelope, thereby reducing heating and cooling



One of the Jayar homes under construction.

Frank's a big fan of spray foam. "It seals everything, so it saves labor time," he explains. "While we absorbed the additional cost, it factors in well when you consider that it reduced the labor time in caulking and sealing all the joints."

Frank believes that one of the most important elements in learning how to build an efficient home was performing an airtightness test using a blower door at each stage of the shell construction.

# JAYAR CONSTRUCTION

"Minor changes were made in framing, insulation, and the HVAC system. In the long run, it creates a quality product that doesn't break the budget," says Frank.

Jayar Construction is committed to building quality homes, and has been working with IBACOS to improve their construction practices for more than two years. They've been through a long process of learning the new strategies and techniques required to radically change their construction practices.

Jayar Construction and IBACOS partnered to ensure that all Jayar's homes meet performance standards established for the Summerset community. Throughout the design and construction of their first Estate Home, Jayar and IBACOS worked closely together to understand the community's performance standards and

loads. Consequently, the mechanical system was downsized, saving up-front equipment costs. In the long term, the homeowner's utility costs will be lower. The couple who bought the first Estate Home reported that their energy bills in the summer of 2003 were around \$140 a month, which is remarkable considering their home is 6,400 square feet. Of course, low utility bills keep customers happy, something important to Jayar.

In addition, the air distribution system was made more efficient by implementing a carefully engineered layout and airsealing ductwork. A mechanical ventilation system was also installed to provide a continuous supply of fresh air to the occupants.

Spray-applied expanding foam insulation was used as the primary insulation system throughout the house. It was installed at the finished basement walls and in the entire exterior envelope, from the bandjoist at the foundation to the ridge beams in the roof system.

This showed their progress relative to the total airtightness target in the Summerset Standards.

From these quality control tests, Frank has learned that, "It doesn't take super expensive doors and windows to make a home energy efficient. The real important work is sealing the envelope."

"Look at these and standard houses," Frank says, expanding his arms to take in the foyer, kitchen, and living room that surround him, "and you can really see a difference." Jayar's customers sure do, and that's the real measure of success.



Left: UL-181 approved mastic is used to seal duct work; Top right: A Jayar home under construction; Near bottom right: Expanding spray foam is used to insulate wall cavities; Far bottom right: Open web trusses are used for floor framing to allow easier routing of electrical, plumbing, and HVAC systems.





# NRS Issues Results of 2003 Customer Satisfaction Study

by Paul Cardis, Sean Boyce, and Alan Sanderfoot

Customer satisfaction is vital for the survival and growth of any business, and nowhere is that more true than in the homebuilding industry.

To identify the top performers in customer satisfaction, NRS Corp., which does customer satisfaction research for more than 300 home building companies nationwide, conducted an independent study. With 205 building companies representing 30 states in the study, NRS surveyed 55,177 homeowners who had closed on a new home in 2002 about homeowner satisfaction, making this the largest study of its kind in the home building industry. Unlike the J.D. Power research study, which relies on public records used to access closings, the NRS Award study is based entirely on closing information submitted directly by participating builders. NRS Corp. and Reed Business Information jointly verified the accuracy and completeness of the information submitted to NRS.



Homeowners were surveyed about their satisfaction in several key areas: home features, floor plan/layout, quality of materials, quality of workmanship, price/value, lot and location, sales process, lending process, options/upgrades/colors, office staff, project superintendent, walk-through, post-move-in warranty service, number of items identified for correction, time taken to make corrections, overall recommend intentions and actual recommend behavior.



The major differences between the top five rated builders versus the rest deal mainly with warranty service:

- Finished work in timely manner
- Quality repairs and services
- Adequately cleaned after work
- Began work in timely manner
- Immediately contacted to schedule

Every builder and market is unique, so what one builder does to improve customer satisfaction won't work for every builder. One size does not fit all. Nevertheless, whether you're a custom builder closing on 30 homes a year or a production builder closing on 30,000, your success depends on customer satisfaction. [f1](#)

*This article courtesy of NRS Corporation. Read the complete article at <http://www.housingzone.com/topics/pb/nrs/pb03ia022a.asp>*

These are just a few of the ways that winners of the 2003 NRS Award in Homeowner Satisfaction differentiate themselves from the competition:

- Pulte Homes of Phoenix delivers 80% of its homes with insulation blown under the roof line rather than onto the attic floor, creating an energy-efficient home guaranteed to have energy costs within a specific range every month.
- Ausherman Homes requires its employees and trades to put on sanitary booties before entering customers' homes for any follow-up work after move-in.
- Barone Homes is in contact with its home buyers two to four times daily.
- Cedar Knoll Builders schedules warranty appointments with trade contractors during the home inspection while the buyer is present.
- Among many other personal touches, The Green Co. snaps a picture of the buyers when a sale is made and then regularly takes photos of their home during construction. At closing, buyers receive a personal photo album.
- Pringle Homes has a customer-care department with specific individuals assigned to each buyer. These individuals are a continuous point of contact for buyers, from contract signing to closing, eliminating miscommunication during transition points.





## Why **You** Should Care About High Performance Lighting

When builders design and construct homes, usually the last thing on their list is what lighting design to implement. Most times, a minimal lighting package is installed with a single hard-wired source or switched outlet for each room, and the assumption is made that the homeowner will supply whatever additional fixtures they may want to have, or recessed can fixtures are installed as the basic lighting throughout the house. In either case almost all fixtures will use incandescent lamps. This can provide an attractive quality of light but it generates a lot of heat, which increases energy required for air conditioning; these fixtures are very inefficient. Lighting that is both high quality and high efficiency based on the use of top quality fluorescent fixtures can provide a very good residential lighting environment.

So why should you care? You should care because your customers care, and in a marketplace where there is often little difference between builders' products, a small competitive advantage may be all you need to keep a home-buyer from looking elsewhere. At least, that was the consensus builders came to at a meeting IBACOS held in May to discuss lighting. As part of a quality home, high performance lighting design not only improves the look and feel of rooms, but can also reduce the energy required for lighting and cooling. An educated consumer will nine times out of ten choose a better quality lighting design, but the key is being able to show them the difference. One specific study done at a lighting demonstration in Rochester, New York, found that 78% of the consumers visiting their demo home preferred the high performance lighting design, and 97% of those consumers would pay more to install a similar lighting scheme in their homes. The facts are clear: if the consumer sees better lighting, the consumer will pay for better lighting.


### If You Build It, They Will Come

The best way to show your customers how good a well-lit home looks and feels is to build a demonstration room, or if you can, incorporate a high performance lighting design into an entire model home. A good lighting design is difficult to describe in a marketing package or even an advertisement. A demonstration room provides potential buyers the chance to actually see what their home could look like with an advanced design. Not only will the lighting shine, but everything about your homes will look brighter.

### How Do I Get Started?

If you've never considered employing a high performance lighting design in your homes, it can be a daunting task. Some builders, like the ones at the meeting we held in May, had no idea how to apply advanced designs. Lighting designers, who understand high performance lighting principles, can provide significant guidance when starting to consider how to upgrade your lighting packages. Even

if for just one house or a selection of the most important rooms in one house, the suggestions the designer makes can help mold your entire strategy and give you the eye to look for other appropriate options. Other resources include books and websites such as the Demonstration and Evaluation of Lighting Technologies and Applications program at the Lighting Research Center at Rensselaer Polytechnic Institute; and Lighting Pattern Book for Homes by Russ Leslie.

For more information on the advantages of incorporating high performance lighting design into your homes, see the "Advanced Residential Lighting Design" article in the January 2003 issue of the Quality Home® newsletter. 



In photo 1, a kitchen is lit by a low quality fluorescent fixture. The result is a dreary room with little character. In photo 2, the same kitchen is lit by recessed incandescent downlights. The result is a warmer, more inviting space, but heat build-up and energy use are high. In the third photo, under and above cabinet high quality fluorescent lighting provides excellent indirect light for the entire kitchen with complementary task light on the counter.

# Investing in Your People and Their Know-How

As somewhat of a technology geek, I have to admit enjoying a recent advertising campaign. Run by IBM for their iSeries business servers, the ads centered on the same scenario: a fellow technology geek presenting to the executives a new magic solution to all of their IT problems. My favorite was an ad that showcased magic pixie dust—sprinkle it on your crashed server and, like magic, it comes back online. Use a little dust regularly and the server remains fully operational.

me, training your people in the most important aspects of construction quality and customer satisfaction is a no-brainer; it will pay you multiple dividends. Unfortunately, providing clear, concise, consistent principles, and best practice solutions quickly and across all divisions is one of the biggest challenges we all face as growing builders."

Your employees, as well as those of your vendors, are some of your company's greatest assets, but we often think of land

As the industry's leading provider of web-based training and education, BuildIQ can help you to broaden your team with the knowledge and skills necessary to consistently deliver quality homes that meet your customers' expectations—at closing, through the warranty period, and beyond. The BuildIQ University curriculum teaches industry best practices and regionalized construction solutions on critical issues including Mold Prevention & Water Management, Foundations, Drywall & Paint, and Building Science. In addition, BuildIQ offers training in Customer Relations. You can learn more about BuildIQ's current course curriculum by visiting their website at [www.BuildIQ.com](http://www.BuildIQ.com).

In 2004, BuildIQ will be expanding its course offerings to address safety and OSHA regulations and other fundamental "Building Blocks," including Framing, HVAC, and Plumbing. With this growing curriculum, a builder can create a learning path for each employee or employee of a trade partner to provide them with the skills they'll need to do their job consistently and correctly all the time. However, web-based training can't fully replace the individualized

**Train your people in the most important aspects of construction quality and customer satisfaction. It's a no-brainer. It will pay you multiple dividends.**

-George Casey, President, Arvida Mid-Atlantic Division


With rising interest rates and skyrocketing costs for insurance, as well as increased customer expectations, wouldn't it be nice to have a little magic pixie dust for the homebuilding industry? Why, you'd just sprinkle a little over each subdivision and your houses would be of higher quality, free of defects, stellar customer satisfaction, and your profit margins would increase. Yes, that would certainly be nice. Unfortunately, I'm not aware of any such concoction!

However, if you're looking for something to invest in and reap those rewards all builders are seeking—risk mitigation, customer satisfaction, and profit protection—I have a suggestion. Invest in those around you. George Casey, President of Arvida's Mid-Atlantic division, highlighted this very point during his presentation at the 2003 Benchmark Conference. "People and process improvement are at the very core of maximizing a homebuilder's return on assets. They make the difference between mediocre and outstanding financial performance. For

positions, model homes, office equipment, and construction materials first. Increasing return on assets means maximizing the productivity and consistency of both your employees and your trade partners as they approach their daily tasks. In doing so, you will inherently begin to create a learning culture within your organization, a business environment that promotes learning, and a means to improve your bottom line.



attention provided through mentoring. Nor can it replicate the merits of group discussion and role-playing offered by classroom training. In order to maximize knowledge retention, BuildIQ recommends formalizing a blended approach to employee development, one that requires both commitment and discipline to implement and sustain.

To learn more about the business benefits of a learning organization and tactics you can employ to achieve them, read *Ten Steps to a Learning Organization* by Peter Kline available online at [amazon.com](http://amazon.com). Or, you can visit BuildIQ at the International Builders' Show in Las Vegas, January 19 through 22. And, please let me know if you find any of that magic pixie dust! 

-Glenn Cottrell

*Glenn is the Program Manager for Builder Universities at BuildIQ. He can be contacted via email at [gcottrell@buildiq.com](mailto:gcottrell@buildiq.com).*



# WET BASEMENTS...

## THE SAGA CONTINUES

It used to be that customers assumed that their home's basement was doomed to get wet. While water spouting out of the wall during heavy rains was pushing the limits, many customers felt that a little dampness was just par for the course, and made sure to keep boxes of keepsakes off the floor. But as customers become more savvy and demand better performing homes, they require that basements be free of moisture and dampness—which can contribute to rot, mold, and fungal growth, can lead to indoor air problems, and can damage wood floor joists and beams. Additionally, builders are looking for solutions to reduce litigation and make sure their customer satisfaction ratings stay high.

In our April 2002 QualityHome® newsletter, we presented best practices for insulation and moisture control of a basement wall configuration. These best practices were used in the recently constructed IBACOS Demonstration Home built in Pittsburgh, Pennsylvania (see the August 2003 QualityHome® newsletter for more information). In this article, we look at a range of basement insulation and moisture control measures that provide good to excellent performance while offering a broader range of construction options.

Foundation moisture can come from three sources: bulk water from soil entering through cracks or pores in the foundation wall, capillary moisture drawn up through the footing and into the foundation wall, diffusion of water vapor through the wall, and condensation of interior moist air on cold foundation surfaces.

To combat the first type of moisture, wall leakage, IBACOS recommends using a full elastomeric coating of the foundation exterior from the bottom edge of the footing to grade and providing an exterior drainage plane to drain water down and away from the wall to a footing drain. These two materials create a waterproof foundation system. This eliminates hydrostatic pressure on the wall, the driving force of wall leakage. The exterior drainage plane can be provided by a coarse gravel layer, a specialty drainage blanket (like Enkadrain, Mirafi, etc.), or rigid fiberglass insulation board. This latter material provides both drainage and insulation. All drainage layers should be separated from the soil backfill by a filter fabric to prevent clogging by very fine silt or clay particles over time.

The second type of moisture flow, capillary draw, can be minimized by providing a capillary break between the footing and the foundation wall. This is a very important action that



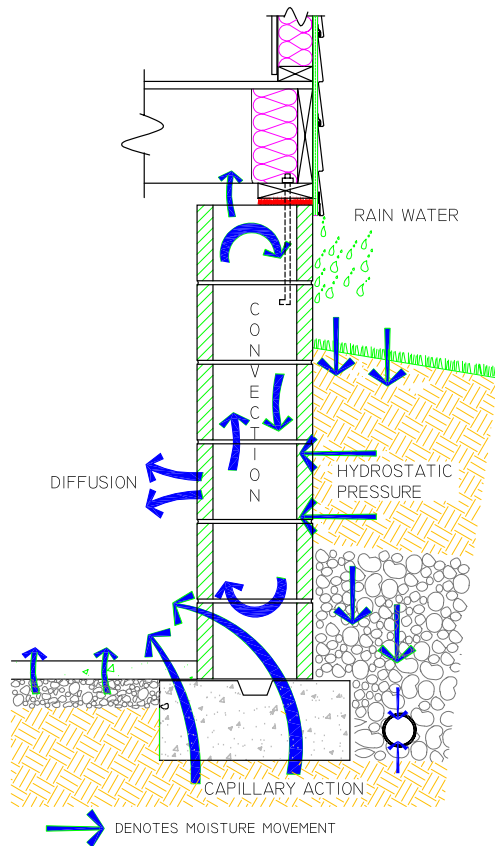
builders are hesitant to take for fear of the wall structure slipping. However, we successfully used a capillary break in the IBACOS Demonstration Home, and feel that builders should be confident a capillary break won't cause slippage. The capillary break can be achieved by applying either a sheet of polyethylene or a layer of a polymer-enhanced asphalt membrane on top of the footing, underneath the foundation wall. Note that this capillary break is a virtual extension of the typical polyethylene sheet under the basement floor slab and serves the same function.

Diffusion of moisture through a foundation wall is prevented by providing a good waterproof system on the outside and a capillary break between footing and wall.

When warm moist indoor air comes in contact with a cold foundation wall, condensation can occur. This is typically seen in spring and early summer when the soil behind the foundation is still cold. The best control of this foundation interior surface temperature is offered by exterior foundation insulation, typically rigid fiberglass or polystyrene foam. IBACOS strongly recommends this practice. Two alternative, but less desirable, interior insulation methods are: 1) low permeance foam insulation, which keeps moisture from passing through the insulation or 2) highly permeable insulation that will allow drying to the interior. It is also important to provide conditioned (heated or cooled) air in the space to promote drying conditions year round. Best practice details for these configurations follow on the next two pages.

*Note that this discussion applies to basements. For information on controlling moisture in crawl spaces, see "Consider the Crawl Space" in the July 2002 QualityHome® newsletter.*

# WET BASEMENTS

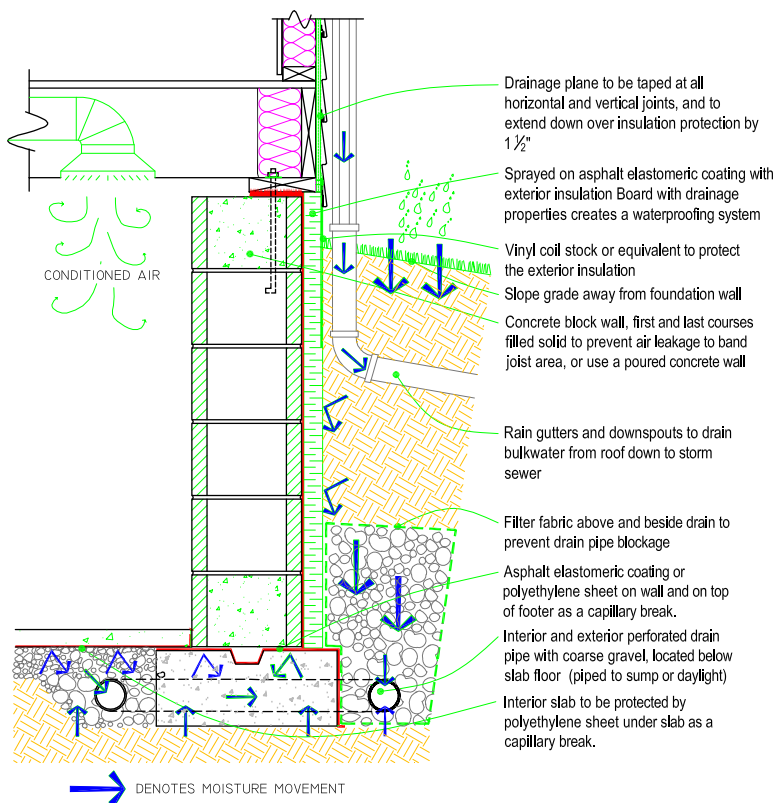


**FIGURE A: HOW MOISTURE CAN ENTER FOUNDATION WALLS.**

The first step in implementing a thorough water management strategy is understanding how moisture moves. Moisture can sneak its way from the soil and into porous materials, like the foundation walls.

Through hydrostatic pressure, water will find defects in even the toughest materials. Eventually the pressure of the water in the soil (if not allowed to drain) will be too much, and moisture will force itself into any cracks or pores of unprotected areas. And once the wall is wet, water vapor can evaporate to the drier foundation interior or run across the floor.

Also in open spaces, like an open core concrete block, air circulates by convection, and can draw moist air up through any cracks or openings in the foundation. This creates a double whammy: the foundation gets wet, and the circulating air may lead to air leakage into the adjacent living space. When using concrete block for the foundation wall, it's best practice to fill in the bottom and top courses, if not the entire wall, to prevent air circulation and improve thermal performance.



**FIGURE B: IBACOS RECOMMENDS EXTERIOR INSULATION.**

IBACOS recommends insulating outside the foundation from the first floor plate to the footer. Insulation placed on the exterior keeps the foundation warm and dry, thereby limiting the opportunities for condensation to occur on its interior surface. Exterior insulation also allows the homeowner to finish only the portion of the basement that is needed for occupancy, reducing the overall cost of the system.

Make sure the elastomeric coating is sealed to capillary break material, or extend the capillary break material several inches up the wall.



# W E T   B A S E M E N T S

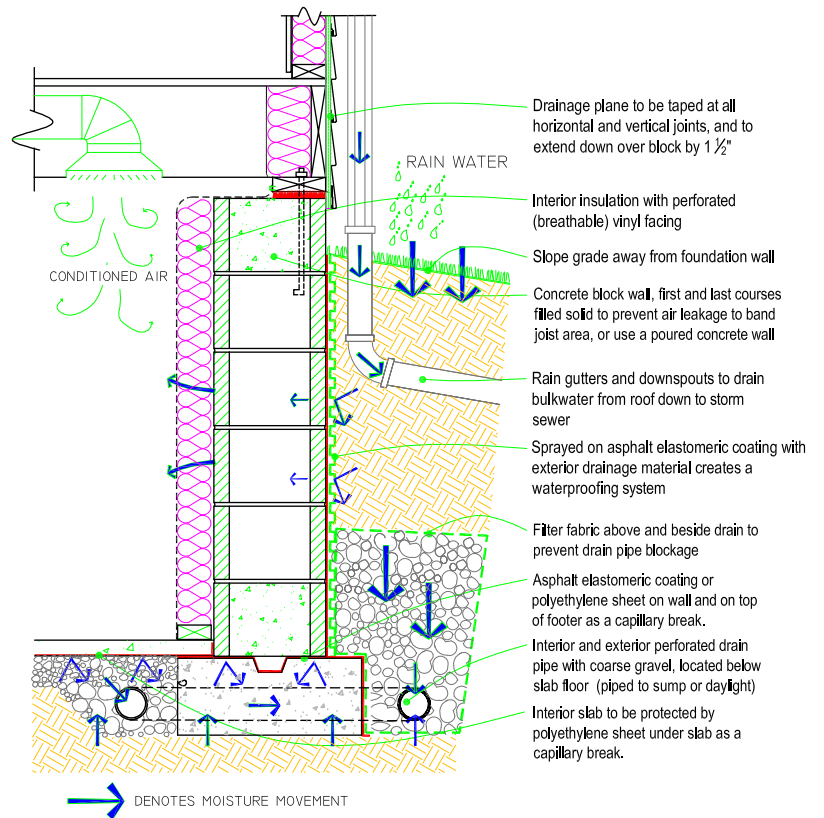
**FIGURE C: HIGHLY PERMEABLE INTERIOR INSULATION IS ONE ALTERNATE OPTION.**

Using highly permeable insulation on the interior surface of the wall promotes evaporation of any moisture that could enter through the interior surface of walls, allowing walls to dry to the interior. However, while the wall surface should remain dry, the evaporation from the walls will add moisture to the space. You'll want to limit the overall humidity, to prevent interior moisture-related problems. IBACOS' recommended solution is to design an adequate amount of airflow and dehumidification.

Another drawback is that the use of insulation on the interior means the walls stay colder during the winter, slowing the drying process. In addition, the exposure of the cold wall to elevated humidity levels may lead to condensation on the upper part of the wall during the winter in cold climates.

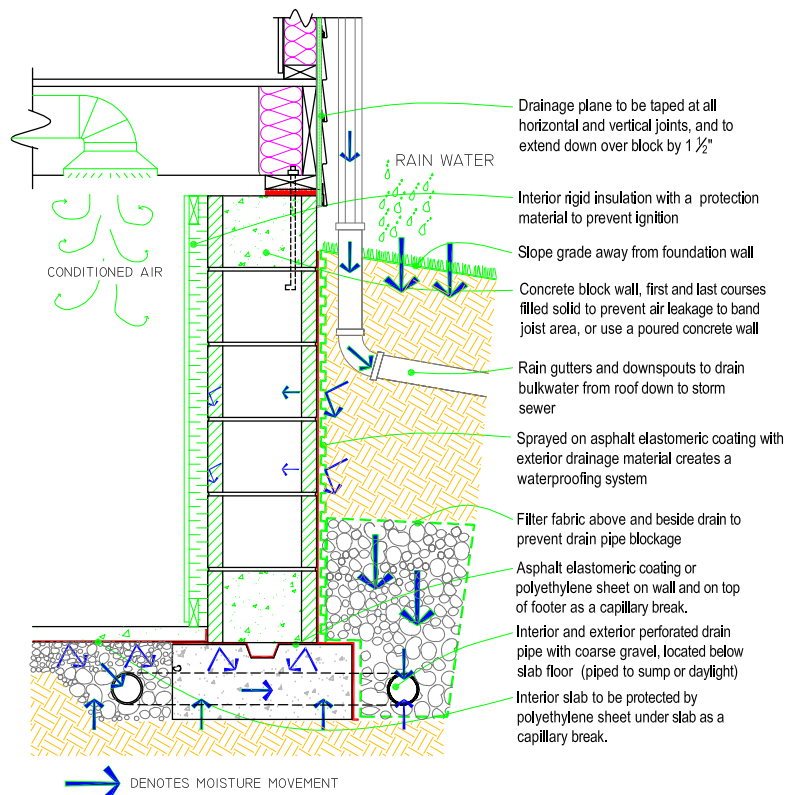
Because of these drawbacks, this insulation system should only be used when exterior insulation is not possible.

An additional course of solid or filled-core block should be used at the grade line, if applicable, to further prevent internal air currents.



**FIGURE D: LOW PERMEANCE FOAM INSULATION IS A SECOND OPTION.**

Using low permeance foam insulation isolates the interior surface of the walls from the basement. Compared to highly permeable interior insulation, this is a better approach because if there is any moisture on the interior surface of the wall, it won't get into the living space. In addition, properly installed low permeance foam insulation may lower the humidity of the adjacent living space air. A drawback with this system is that it must be covered with a protection material, commonly drywall. This creates an additional expense for the system.



# Ask the Building Scientists

**Q** Why is perimeter slab insulation important? Where and how should perimeter slab insulation be applied? Is there any way to eliminate perimeter slab insulation completely?

-Pam Cole and Diana Shankle  
Building Energy Codes Program at  
Pacific Northwest National Laboratory

**A** The impact of slab edge insulation varies with the basic level of thermal performance of a house, and with climate conditions. Houses built to pre-1993 Model Energy Code (MEC) standards had such large thermal losses through the rest of the building enclosure (walls, windows, roof, etc.) that slab edge losses were a relatively insignificant portion of the total loss. With improved standards (MEC 95, IEC, Energy Star®, and Building America) the relative importance of slab edge thermal losses has grown because other building enclosure losses have been greatly reduced. Thus, slab edge insulation is desirable in all but the most mild of climates (San Diego, Hawaii, Miami, etc.)




Slab edge insulation, in addition to reducing energy use, helps keep the edge of the floor slab warm in winter, a comfort issue, and will help to control condensation potential.

The thickness and configuration of slab edge insulation varies by climatic location. Generally, R-5 insulation is considered a minimum in the climate regions where slab-on-grade

construction is common (mixed and hot-dry climates.) Higher levels may be required for specific building codes. It is desirable to have a two-foot depth of insulation, if possible. The configuration of this insulation is highly dependent on the nature of the slab construction and may be on the outside or inside of a slab edge or grade beam. It may be projected horizontally out from the slab edge or under the slab. Note that in mixed and hot climates, insulation more than two feet under the slab is not desirable because the cool ground (but not cold) is an aid during air-conditioning periods. Details of many configurations are available in the Energy and Environmental Building Association (EEBA) Builder Guides (visit [www.eeba.org](http://www.eeba.org) for more information).

Protection of exterior slab edge insulation and its role as a pathway for termite movement to the frame of the house are major concerns. The use of termite aversive insulations, such as fiberglass board stock combined with a termite shield at the sill plate are helpful. Physical protection with rigid materials is still necessary. There are several protection systems on the market using panel materials or trowled-on coatings. Placing the insulation inside the foundation, either vertically or horizontally, though not as thermally protective as the exterior installation, will avoid termite and physical protection problems.

Details have been developed that, though not eliminating slab edge insulation, have replaced it with a downward extension of exterior wall insulation in a brick veneer wall. While often not easy to do, good slab edge insulation is an important part of the high performance home. 

-John Holton,  
Research Project Manager

## HOW MANY BUILDING SCIENTISTS DOES IT TAKE TO SCREW IN A LIGHTBULB?



*Pondering a pesky problem? Just curious about why buildings sometimes behave badly? Get the straight scoop from IBACOS' building scientists by emailing your questions to Stacy Hunt at [shunt@ibacos.com](mailto:shunt@ibacos.com).*

# The Mad Scientist

You're convinced. All signs point to how building quality homes can grow your top line and boost your bottom line—you know customers will be happier with a comfortable, efficient, and overall well-performing home, resulting in more referrals, fewer callbacks, and lower warranty expenses. But how the heck do you even begin? Improving the homes that you build requires not only changing your construction practices, but also the philosophy of your company and the process of how it operates. So how do you do *that*?

It's a good question, one that IBACOS is trying to find the answers to through a current research project called (surprise, surprise!) the Process Research Project.

In order to cost effectively build quality homes, a builder needs to critically assess their operations and processes, and be willing to make changes where necessary. IBACOS has found builders who are achieving higher performance levels are using different strategies throughout the planning, design, and build phases. Builders are also using different marketing techniques to convey the value of high performance homes to consumers. Easier said than done. Many builders often don't know where to start, what the steps are, or who to ask.

IBACOS is one of only a few organizations looking into the links between operational processes and the quality and performance of the completed houses. Duncan Prael, who's leading the Process Research Project, is trying to understand the processes and tools a builder needs when making the transition from conventional construction to building high performance homes. He's also researching how the industry can develop reliable local resources to support builders.

Our work involves examining what processes are needed, including setting performance standards, developing an integrated design process, measuring results, and documenting what types of activities need to take place. We are also analyzing industry needs, like contractor certification programs to ensure that trades understand the nuances of quality construction, the way to detail construction and purchasing documents to ensure best practices are implemented in the field, how building performance could be a key metric

in determining bonuses, and understanding the overall financial repercussions of achieving higher performance. This seems simple in concept, but the hard part, the guts of the Process Research Project, is figuring out exactly how to do it.

"With many of the tools and resources available today, simply developing the 'kit of parts' to build better homes isn't necessarily rocket science. (See "Quality Homes in Cold Climates" in the October 2003 Quality Home® newsletter.) The difficulty lies in the changes to the builder's operations, processes, and construction methods in order to implement it most cost effectively. Our goal is to develop and document these processes, and develop a support network of local specialists who can help builders through the transition and provide ongoing building performance feedback," said Duncan. Many builders simply take an additive approach, and are not aggressively looking at how to design for performance from the outset of a project.


An integrated design process is one area where builders can reap big benefits. In a worst-case scenario, a house design is purchased from an architect and given to a structural engineer who provides framing layouts and key structural details. Once framing is completed, the plumber, electrician, insulator, and HVAC contractor are told to "make it work." They get the job done, but it isn't pretty. The builder calls the framer back to reinforce all the notched joists, drop a soffit around the plumbing run

in the living room and build a chase around the B-vent. The result is, all too often, rooms that won't maintain desired comfort levels, with inadequately insulated areas and unsightly design modifications.

Using an integrated design process, the builder starts with a set of performance standards developed before the design process begins. These standards lay out the overall performance parameters of the house, and include the strategies that will be used to achieve them (i.e. all ducts located inside the conditioned space, by putting the HVAC system inside a conditioned unvented crawlspace). Then the architect, engineer, and trade partners meet throughout the design phase to ensure that the performance standards are being achieved, and that all the systems and strategies are coordinated before construction begins. During this phase, energy calculations are performed, heating and cooling systems are sized, and all of the systems are integrated with the desired aesthetic and structural aspects of the house. This information is documented on the construction drawings and in scopes of work, so that information from the design phase can flow smoothly to purchasing and to the field.

Adopting an integrated design process is challenging, in that most of the participants have to be encouraged to rethink their role. Few HVAC contractors are asked where they would ideally locate the furnace as the schematic designs are being started. The framer is seldom asked when the room sizes are being designed what the most efficient layout for a wall or floor system would be. And architects have for years relinquished responsibility for balancing the aesthetic, structural, and systems integration in order to come up with creative solutions that meet the project requirements and budget.

Is Duncan and the IBACOS team mad for tackling this challenge? "Actually, my alter ego is a mad scientist...although I am kind of disappointed that we're not issued lab coats with our names embroidered on them and spiffy anodized aluminum clipboards. I think it would add a whole new dimension to our research."

Find more information on this research project at [http://www.ibacos.com/pubs/Report%20Overview%20for%20Builders\\_website.pdf](http://www.ibacos.com/pubs/Report%20Overview%20for%20Builders_website.pdf). 



IBACOS' Anthony Grisolia (l) and Duncan Prael (r) review construction drawings.



# IBACOS

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IBACOS, Inc. (Integrated Building And Construction Solutions) was founded in 1991 to help enable the homebuilding industry to deliver Quality Homes®—homes of inherently higher performance that are safe, healthy, durable, comfortable, and efficient. To this end, IBACOS works with the nation's leading builders, manufacturers, associations, government programs, and national laboratories, all with a common interest in creating and delivering measurably better homes.

Our work is focused in two areas: Research and Market Delivery. Our Research Team investigates the basic science of home performance and its impact on the processes of design, construction, and homeownership. Our Market Delivery Team provides the industry with design and construction phase assistance, including training, demonstration projects, and other information that enables builders to deliver Quality Homes®.

IBACOS' research activities are supported in part by the following organizations:

U.S. Department of Energy's Building America Program  
[www.buildingamerica.gov](http://www.buildingamerica.gov)

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## Upcoming Conferences

Learn more about current building science topics at these upcoming conferences. For conferences at which IBACOS is presenting, the speaker and the topic of the presentation is listed.

January 19 through 22  
International Builders' Show  
[www.nahb.org](http://www.nahb.org)  
Las Vegas, Nevada  
Brad Oberg  
Mold: Preventive Medicine



January 24 through 28  
ASHRAE Winter Meeting  
[www.ashrae.org](http://www.ashrae.org)  
Anaheim, California



February 4 through 5  
Solutions for Success  
[www.affordablecomfort.com](http://www.affordablecomfort.com)  
Rye Brook, New York  
Duncan Prah  
Moisture Resistant and Healthy Homes and Managing the Construction of an Energy Star® Home



March 1 through 3  
RESNET Conference  
[www.natresnet.org](http://www.natresnet.org)  
San Diego, California  
Duncan Prah  
Advanced Certification of Home Energy Raters



March 10 through 13  
NESEA Building Energy Conference  
<http://www.nesea.org/buildings/be/>  
Boston, Massachusetts



March 18 through 19  
Greenprints Green Building Conference & Tradeshow  
[www.greenprints.org](http://www.greenprints.org)  
Atlanta, Georgia  
John Broniek  
Incorporating Advanced Technologies

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